AMENDMENTS TO THE CLAIMS

1. (Previously Presented) A method for removing polymer etch residue from an etched opening in a silicon wafer device comprising:

forming an opening in an insulating layer, wherein a polymer etch residue remains within said opening after the opening forming step;

contacting said opening with a first plasma to remove a portion of said polymer etch residue;

stopping said contacting with said first plasma before all of said polymer etch residue is removed; and

contacting said opening with a second plasma to remove the polymer etch residue not removed by said first plasma, said second plasma generated from a gas consisting of ammonia and said first plasma being generated from a different gas.

2. (Original) The method of claim 1, wherein said opening is a High Aspect Ratio (HAR) contact opening.

3. (Previously Presented) The method of claim 2, wherein said contacting with said first and second plasmas is performed under conditions effective to remove said etch residue without substantially increasing the size of said opening.

4. (Previously Presented) The method of claim 3, wherein said opening is contacted with said second plasma in the absence of oxygen.

5. (Cancelled)

6. (Previously Presented) The method of claim 2, wherein said contacting with said second plasma is done at a temperature within the range of about 250-500° C.

7. (Previously Presented) The method of claim 6, wherein said contacting with said second plasma is performed in a plasma reactor within a power reactor range of about 500 - 2500 watts.

8. (Previously Presented) The method of claim 7, wherein said contacting with said second plasma is performed within a power range of about 1500 - 2000 watts.

9. (Previously Presented) The method of claim 7, wherein said contacting with said second plasma is performed with an ammonia gas flow rate within the range of about 500 to 1000 SCCM.

10. (Previously Presented) The method of claim 9, wherein said contacting with said second plasma is performed at power of about 1900 watts and a temperature of about 350°C.

11. (Previously Presented) The method of claim 10, wherein said contacting with said second plasma is performed with an ammonia gas flow rate of about 750 SCCM.

12. (Previously Presented) The method of claim 9, wherein said contacting with said second plasma is performed for a period of less than about 100 seconds.

13. (Original) The method of claim 12, wherein said contacting is performed for a period of not more than about 75 seconds.

14. (Previously Presented) The method of claim 1, further comprising forming a conductive layer at a bottom of said opening following said contacting step with said second plasma.

15. (Previously Presented) The method of claim 1, wherein said opening forming step produces silicon nitride at a bottom of said opening, said method further comprising removing said silicon nitride.

16. (Previously Presented) A method for removing polymer etch residue from an etched opening in a silicon wafer device, comprising the steps of:

contacting said opening with a plasma consisting of oxygen to remove a portion of said etch residue, stopping said oxygen plasma contacting before said polymer etch residue is completely removed and thereafter removing any remaining said residue by contacting said opening with a second plasma, said second plasma consisting of a hydrogen containing gas.

17. (Previously Presented) The method of claim 16, wherein said contact opening is an High Aspect Ratio (HAR) opening, and said second plasma contacting step is performed under conditions effective to remove said etch residue without substantially increasing the size of said opening.

18. (Previously Presented) The method of claim 17, wherein said second plasma contacting occurs in the absence of oxygen.

19. (Cancelled).

20. (Previously Presented) The method of claim 18, wherein said second plasma contacting is performed at a temperature within the range of about 250 – 500° C.

21. (Previously Presented) The method of claim 18, wherein said second plasma contacting is performed in a reactor operating in a power range of about 500-5000 watts.

22. (Previously Presented) The method of claim 20, wherein said second plasma contacting is performed at a temperature of about 350°C.

23. (Original) The method of claim 21, wherein said reactor power is about 1900 watts.

24. (Previously Presented) The method of claim 21, wherein said second plasma contacting is performed at a flow rate within the range of about 100 to 4000 SCCM.

25. (Previously Presented) The method of claim 16, wherein said second plasma contacting is performed for a period of time sufficient to remove said residue from a bottom of said opening.

26. (Previously Presented) The method of claim 25, wherein said bottom of said opening is not oxidized during said second plasma contacting step.

27. (Original) The method of claim 24, wherein said contacting is performed for a period of less than about 100 seconds.

28. (Original) The method of claim 27, wherein said contacting is performed for a period of not more than about 75 seconds.

29. (Previously Presented) A method of forming a contact opening in a semiconductor device, comprising:

a) etching a contact opening in an insulative layer in said device down to a polysilicon element of said device;

b) contacting said opening with an oxygen plasma to remove a portion of said etch residue; and

c) removing any remaining etch residue from said etched opening by contacting said opening with a plasma consisting of a hydrogen containing gas in the absence of added oxygen.

30. (Currently Amended) The method of claim 29, wherein said contacting <u>said opening with an oxygen plasma and with a plasma consisting of a hydrogen containing gas in the absence of added oxygen</u> is performed under conditions effective to remove said etch residue without substantially increasing the size of said opening.

31. (Currently Amended) The method of claim 30, wherein said contacting <u>said opening with an oxygen plasma and with a plasma consisting of a hydrogen containing gas in the absence of added oxygen</u> is performed under conditions which do not oxidize said opening.

32-33. (Cancelled)

34. (Currently Amended) The method of claim 29, wherein said contacting said opening with a plasma consisting of a hydrogen containing gas in the absence of added oxygen is done in a plasma reactor at a temperature within the range of about 250 - 500° C, with a reactor power within the range of about 500 – 2500 watts, with an ammonia gas flow rate of about 500 to 1000 SCCM, and for a period of no more than 100 seconds.

35. (Currently Amended) The method of claim 34, wherein said contacting said opening with a plasma consisting of a hydrogen containing gas in the absence of added oxygen is performed within a reactor power range of about 1500 - 2000 watts.

36. (Currently Amended) The method of claim 34, wherein said contacting said opening with a plasma consisting of a hydrogen containing gas in the absence of added oxygen is performed with a reactor power at about 1900 watts and a temperature of about 350°C.

37. (Currently Amended) The method of claim 34, wherein said contacting said opening with a plasma consisting of a hydrogen containing gas in the absence of added oxygen is performed at a gas flow rate of 750 SCCM.

38. (Currently Amended) The method of claim 35, wherein said contacting said opening with a plasma consisting of a hydrogen containing gas in the absence of added oxygen is performed for a period of not more than about 75 seconds.

39. (Original) The method of claim 29, further comprising forming a silicide layer at the bottom of said contact opening following said contacting operation.

40. (Cancelled)

41. (Original) The method of claim 29, wherein an insulating layer is formed on said device prior to said etching and said etching forms a contact hole in said insulating layer.

42. (Original) The method of claim 41, wherein said etching is dry etching.

43. (Original) The method of claim 42, wherein said dry etching is performed using at least one fluorine-containing gas.

44. (Original) The method of claim 43, wherein said fluorine-containing gas is at least one gas selected from the group consisting of CH_2F_2, CHF_3, C_2F_6, C_2HF_5, and CH_3F.

45-49. (Cancelled)

50. (Currently Amended) A method of forming an integrated circuit structure comprising:

forming an insulating layer over a polysilicon region;

forming a high aspect ratio contact opening in said insulating layer down to said polysilicon region using a fluorine containing gas;

removing polymer residue from said contact opening by first contacting said opening with a first plasma, stopping said first contacting, and subsequently contacting said opening with a second plasma, said first plasma consisting of a gas other than ammonia gas and said second plasma consisting of ammonia gas, said removing

polymer residue providing an oxide free bottom of said contact opening without substantially increasing the size of said opening;

forming a silicide layer at the bottom of said opening in contact with said polysilicon layer;

forming a conductor in said opening in electrical contact with <u>said</u> silicide layer.

51. (Cancelled)

52. (Previously Presented) A method as in claim 50 further comprising removing a portion of said polymer residue from said contact opening with oxygen prior to using said gas which provides an oxide free bottom of said contact opening.

53. (Original) A method as in claim 50 wherein said silicide layer is a titanium silicide layer.

54. (Previously Presented) A method for removing polymer etch residue from an etched opening in a silicon wafer device comprising:

forming an opening in an insulating layer, wherein a polymer etch residue remains within said opening after the opening forming step;

first contacting said opening with a first plasma to remove a portion of said polymer etch residue;

stopping said first contacting; and

subsequently contacting said opening with a second plasma to remove the remainder of said polymer etch residue, said first plasma being generated from a gas other than a hydrogen-containing gas and said second plasma being generated from a gas consisting of hydrogen gas.

55. (Previously Presented) The method of claim 54, wherein said opening is a High Aspect Ratio (HAR) contact opening.

56. (Previously Presented) The method of claim 55, wherein said subsequent contacting is performed under conditions effective to remove said etch residue without substantially increasing the size of said opening.

57. (Previously Presented) The method of claim 56, wherein said opening is contacted with hydrogen gas plasma in the absence of oxygen during said subsequent contacting.

58. (Previously Presented) The method of claim 55, wherein said subsequent contacting is done at a temperature within the range of about 250-500° C.

59. (Previously Presented) The method of claim 58, wherein said subsequent contacting is performed in a plasma reactor within a power reactor range of about 500-2500 watts.

60. (Previously Presented) The method of claim 59, wherein said subsequent contacting is performed within a power range of about 1500-2000 watts.

61. (Previously Presented) The method of claim 59, wherein said subsequent contacting is performed with a hydrogen gas flow rate within the range of about 500 to 1000 SCCM.

62. (Previously Presented) The method of claim 61, wherein said subsequent contacting is performed at power of about 1900 watts and a temperature of about 350°C.

63. (Previously Presented) The method of claim 62, wherein said subsequent contacting is performed with a hydrogen gas flow rate of about 750 SCCM.

64. (Previously Presented) The method of claim 61, wherein said subsequent contacting is performed for a period of less than about 100 seconds.

65. (Previously Presented) The method of claim 64, wherein said subsequent contacting is performed for a period of not more than about 75 seconds.

66. (Previously Presented) The method of claim 54, further comprising forming a conductive layer at a bottom of said opening following said subsequent contacting step.

67. (Previously Presented) The method of claim 54, wherein said opening forming step produces silicon nitride at a bottom of said opening, said method further comprising removing said silicon nitride.

68. (Previously Presented) The method of claim 54, wherein said subsequent plasma contacting is performed for a period of time sufficient to remove said residue from a bottom of said opening.

69. (Previously Presented) The method of claim 54, wherein a bottom of said opening is not oxidized during said subsequent plasma contacting step.

70. (Previously Presented) A method for removing polymer etch residue from an etched opening in a silicon wafer device comprising:

forming an opening in an insulating layer, wherein a polymer etch residue remains within said opening after the opening forming step; and

removing said polymer etch residue by contacting it with a first plasma and a second plasma, said first plasma being used to remove only a portion of said residue, said second plasma being used to remove the remainder of said polymer etch residue, said first plasma generated from a gas not containing hydrogen and said second plasma generated from a gas consisting of methane gas.

71. (Previously presented) The method of claim 70, wherein said opening is a High Aspect Ratio (HAR) contact opening.

72. (Previously Presented) The method of claim 71, wherein said contacting is performed under conditions effective to remove said etch residue without substantially increasing the size of said opening.

73. (Previously Presented) The method of claim 72, wherein said opening is contacted with said methane gas plasma in the absence of oxygen.

74. (Previously Presented) The method of claim 71, wherein said contacting is done at a temperature within the range of about 250 - 500° C.

75. (Previously Presented) The method of claim 74, wherein said contacting is performed in a plasma reactor within a power reactor range of about 500 - 2500 watts.

76. (Previously Presented) The method of claim 75, wherein said contacting is performed within a power range of about 1500 - 2000 watts.

77. (Previously Presented The method of claim 75, wherein said contacting is performed with a methane gas flow rate within the range of about 500 to 1000 SCCM.

78. (Previously Presented) The method of claim 77, wherein said contacting is performed at power of about 1900 watts and a temperature of about 350°C.

79. (Previously Presented) The method of claim 78, wherein said contacting is performed with a methane gas flow rate of about 750 SCCM.

80. (Previously Presented) The method of claim 77, wherein said contacting is performed for a period of less than about 100 seconds.

81. (Previously Presented) The method of claim 80, wherein said contacting is performed for a period of not more than about 75 seconds.

82. (Previously Presented) The method of claim 70, further comprising forming a conductive layer at a bottom of said opening following said second plasma use.

83. (Previously Presented) The method of claim 70, wherein said opening forming step produces silicon nitride at a bottom of said opening, said method further comprising removing said silicon nitride.

84. (Previously Presented) The method of claim 70, wherein said first and second plasma contacting is performed for a period of time sufficient to remove said residue from a bottom of said opening.

85. (Previously Presented) The method of claim 70, wherein a bottom of said opening is not oxidized during said second plasma contacting step.

86. (Previously Presented) The method of claim 16, wherein said hydrogen containing gas is ammonia gas.

87. (Previously Presented) The method of claim 16, wherein said hydrogen containing gas is hydrogen gas.

88. (Previously Presented) The method of claim 16, wherein said hydrogen containing gas is methane gas.

89. (Previously Presented) The method of claim 29, wherein said hydrogen containing gas is ammonia gas.

90. (Previously Presented) The method of claim 29, wherein said hydrogen containing gas is hydrogen gas.

91. (Previously Presented) The method of claim 29, wherein said hydrogen containing gas is methane gas.

92. (Previously Presented) A method of forming an integrated circuit structure comprising:

forming an insulating layer over a polysilicon region;

forming a high aspect ratio contact opening in said insulating layer down to said polysilicon region using a fluorine containing gas;

removing polymer residue from said contact opening by first contacting said opening with a first plasma, stopping said first contacting, and second contacting said opening with a second plasma, said first plasma comprising a gas not containing hydrogen gas and said second plasma consisting of hydrogen gas, said removing polymer etch residue providing an oxide free bottom of said contact opening, and which does not substantially increase size of said opening;

forming a silicide layer at the bottom of said opening in contact with said polysilicon layer;

forming a conductor in said opening in electrical contact with silicide layer.

93. (Previously Presented) A method as in claim 92, further comprising removing a portion of said polymer residue from said contact opening with oxygen prior to said second contacting which provides an oxide free bottom of said contact opening.

94. (Previously Presented) A method as in claim 92, wherein said silicide layer is a titanium silicide layer.

95. (Previously Presented) A method of forming an integrated circuit structure comprising:

forming an insulating layer over a polysilicon region;

forming a high aspect ratio contact opening in said insulating layer down to said polysilicon region using a fluorine containing gas;

removing polymer residue from said contact opening by first contacting said opening with an oxygen plasma, stopping said first contacting, and second contacting said opening with a methane-comprising plasma, said removing providing an oxide free bottom of said contact opening and without substantially increasing the size of said opening;

forming a silicide layer at the bottom of said opening in contact with said polysilicon layer;

forming a conductor in said opening in electrical contact with silicide layer.

96. (Cancelled)

97. (Previously Presented) A method as in claim 95, wherein said silicide layer is a titanium silicide layer.